NINAD KALE

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EXPERIENCE

Honeywell, *Embedded Engineer II* — *Bangalore, India | Sept 2020 – Aug 2022*

Designed FOC-based speed controllers for PMSM Motors (20K RPM) used in cooling systems of airplanes. Led a research project with a 5-member team on real-time motor fault analysis. Automated manual tasks, resulting in a savings of 1000+ hrs.

- Doubled PMSM speed to 40K RPM using an optimized FOC control algorithm on a dual-core DSP architecture.
- Saved significant servicing costs by predicting motor's RUL through real-time fault analysis of current signatures.
- Developed drivers: GPIO, ADC, EEPROM, IPC, CAN, I2C, SPI, RS485, and a Generic Bootloader

Larsen & Toubro, *Project Liaison and Technical Lead* — *Mumbai, India | June 2019 – Aug 2020*

Built an industrial-grade underwater ROV for Indian Navy used for ship inspections. ROV is equipped with features such as wall tracking, autonomous station-keeping, and over 100-meter tethered remote control with endurance of 1hr

- End to end vehicle designing to meet specifications of endurance, depth, control, navigation & wall tracking
- Integrated full electrical system: thrusters, actuators, and sensors including DVL, IMU, Altimeter and 3DOF Arm

SKILLS

Programming: Python, C, MATLAB, Simulink, C++, CMake, Bash, Assembly, VHDL
Software: ROS, Git, Linux, PyTorch, gym, CCS, SolidWorks

RESEARCH

F1Tenth, Autonomous Car Racing | *ICRA Paper* | *Advisor : Prof Dantu* | *Video* — *Nov 2022 - Present*

Wrote software package for autonomous car racing. Researched on 2D SLAM. Participated in IROS 23' F1Tenth Competition

- Mapping : Deployed laser based 2D Cartographer and evaluated HectorSLAM & GMapping.
- Localization : Developed an Particle filter with adaptive sampling, CDDT sensor modeling, and kidnap-robot mitigation
- Trajectory : Surface adaptive, grip aware race-line trajectory generation using CasADi optimization
- Controls : Pure Pursuit & Kinematics-Only Differential Flatness based Trajectory Tracking, MPC
- Local Planner : Laser based obstacle detection and RRT based local path planner. Gap following and VFH

University's Interactive Humanoid Assistant | *Advisor : Prof Ratha* | *Video* — *Dec 2022 - Present*

Constructed a social robot utilizing Pepper & Nao to aid students with university-specific inquiries, featuring:

- Wake word response (porcupine), transcription (whisper), custom LLM-based answers with reference links, direction providing, pose mimicking (mediapipe), speaker tracking (PID), face (ArcFace), emotion, and gesture recognition.
- Visual SLAM : Tested SIFT feature based monocular visual slam. Implementing ORB-SLAM

Active Multi-Modal User Recognition | *WNYISPW Paper* | *Advisor : Prof Ratha* — *Sep 2023 - Oct 2023*

- Using audio, video, and sound localization modalities, fusing face (ArcFace) and audio (XVectorSincNet) embeddings

Autonomous Underwater Vehicle (AUV-IITB) | *Advisor : Prof Vacchani* | *Video* — *Sept 2016 - Aug 2020*

Led a team of 55 students in developing three advanced AUVs for competitions, focusing on electrical and software components. The vehicles were designed to tackle real-world challenges such as pinger localization, buoy interaction, and torpedo handling etc.

- Circuit design, position control, and manipulation of 2DOF underwater arm. Accuracy of ± 0.5 deg
- Prototyped acoustic based underwater communication and localization over serial protocol

PROJECTS

• RL based Walking Robot (Imitation Learning, DQN, PPO, TRPO) • DL based Robotic Arm Control • CV based Optical Music Sheet Recognition • Monocular Visual Odometry • Vehicle Tracking and License Plate Recognition using Yolo

AWARDS

Honeywell: Silver Medal 22' | Bronze Medals 21' | Director's Gratitude Note for R&D initiatives, 22'
AUV-IITB: Winner National NIOT 16' & 18' | Finalist International RoboSUB 17' | Led $2 million Industrial project
IIT Bombay: Institute Technical Citation 20' | Institute Technical Special Mention 19' | Young Researcher by IEEE OES

EDUCATION

University at Buffalo, Master of Science, Robotics | GPA: **3.85/4** — *Buffalo, NY | Dec 2023*

"*Active Multi-Modal Approach for Enhanced User Recognition in Social Robots*", WNYISPW Conference 2023
"*SAGA-F1T, Surface-Adaptive Grip-Aware Trajectory Generation for F1Tenth Autonomous Racing*", ICRA 2024

Indian Institute of Technology Bombay, Bachelor of Technology, Aerospace — *Mumbai, India | Aug 2020*

"Technical Design Report of Matsya 6, Autonomous Underwater Vehicle", Robonation 2020